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west virginia department of environmental protection

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## ENGINEERING EVALUATION / FACT SHEET

### BACKGROUND INFORMATION

Application No.:	R13-2877
Plant ID No.:	077-00091
Applicant:	FMW Composite System, Inc.
Facility Name:	Northpointe Bus. & Ind. Park
Location:	(on Hazelton Rd.) Bruceton Mills.
NAICS Code:	335991
Application Type:	Construction
Received Date:	March 22, 2011
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	\$1000.00
Date Received:	March 23, 2011
Completeness Date:	April 4, 2011
Due Date:	July 3, 2011
Newspaper:	<i>The Preston County Journal</i>
Applicant Ad Date:	March 23, 2011
UTMs:	Easting: 626.7 km      Northing: 4,390.8 km      Zone: 17
Description:	Construction of SiC carbon fiber manufacturing facility.

### DESCRIPTION OF PROCESS

FMW Composite System, Inc. (FMW) proposed to construct a manufacturing facility at 78 Northpointe Drive near Hazelton, WV. The manufacturing facility is design to produce silicon carbide (SiC) “coated” carbon fiber. This process applies SiC through the sophisticated application of a class of chemical called silanes in proprietary vapor deposition process, onto a spun carbon fiber. This process is unique in the world for its ability to produce very strong, very lightweight SiC “coated” carbon fibers that are used in aerospace structural members.

Promoting a healthy environment.

Non-confidential

The vapor deposition process, in its simplest form is a reactor, condenser and then scrubber train with only hydrochloric acid vapor as its pollutant of concern. There is also a recovery system as part of the overall process with its own dedicated scrubber.

FMW has claimed significant portions of the provided detail process description as confidential business information under 45 CSR 31. Therefore, no further discussion of the proposed process is provided in this evaluation.

### SITE INSPECTION

On April 4, 2011, this writer conducted an announce site inspection of the facility. Mr. Dale McBride, President, and Mr. Robert Baker, Environmental and Safety Manager were present during this inspection.

The proposed site is located at the Northpointe Business and Industrial Park, which is just off Casteel Road near Hazelton. The park is located on reclaimed mining site. The actual site FMW is proposing was formally own by the local development office, who constructed the existing shell building as part of attempt to attract new business into the Preston County. Currently, FMW has been developing the interior of the existing building to handle their process equipment in a safe manner by constructing walls, collection sumps, finishing floors, and installing HVAC and fire protection systems.

FMW has brought several pieces of equipment on site. It is the opinion of this writer, these units has not has not exceed the pre-construction activities allowed under Rule 13. Emission control equipment and other non-emissions generating equipment has been install. The non-emission generating equipment is the equipment used to create the fiber and heat treat the fiber before the SiC “coating” process.

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During this inspection, this writer informed FMW that the onsite emergency generator needs to be included in this application or register under the general permit for emergency generators. Overall, this site located in an existing industrial park with no residential dwellings within 1,500 feet of the facility.

#### ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

According to the application, the hydrochloric acid (HCl) is the only air pollutant released by the manufacturing process, which is classified as a hazardous air pollutant by the Clean Air Act Amendments of 1990. No criteria pollutants or other hazardous air pollutants are generator and/or released from the proposed manufacturing facility. FMW provided the emission data and estimates based on mass balance calculations and pilot testing.

Before review FMW emission estimates, this writer would discuss why some of the other processes are not emission generating units. There are three main prices of equipment in question. None of these process units consumes or uses any kind of fuel. In addition, the manufacturer of the raw material notes that it contains any volatile components. Therefore, there should not be any regulated pollutants discharged from these process units.

The actual coating process and recovery system has the potential to emit hydrochloric acid. These sources are control with three absorbent control devices (three wet/packed bed scrubbers). FMW design and built these scrubbers with a minimum removal efficiency of 95% for HCl. The potential to emit of HCl from the process is reduced from 421 pounds per year down to 21 pounds with no annual restrictions.

Like the process units, the recovery system has potential to emit only emit HCl. This vent stream for the recovery system will be routed to a one of the three wet/packed bed scrubbers. This level of control would reduce the annual HCl emissions for the recovery system to 167 pounds from 3,331 pounds on annual basis.

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This facility will require several storage vessels and tanks. These vessels are either total sealed or equipped with a nitrogen blanket with 40 psig emergency relief device. Thus, the potential emissions from these fugive sources are not likely during normal operations. In addition, these vessels will be located inside the main structure. Only pressurized vessels will be located outdoors. Therefore, the only emissions from the facility would be 188 pounds of HCl per year.

### REGULATORY APPLICABILITY

The emission units at this facility are only subject emission limitations established in 45CSR7. The coating process and recovery system generates hydrochloric acid mist and/or vapors which is classified as mineral acids under this rule. 45CSR§7-4.2. established allowable nitric acid vapor standards for manufacturing source operations. This rule set an allowable concentration of nitric acid vapors from manufacturing processes. Therefore, the acid vats have an allowable nitric acid concentration limitation of 210 milligrams per dry cubic meter.

Due to the scale and design of the manufacturing, the associated process vents will have very low volumetric flow rates (5 scfm or less for each vent). Therefore, mass rate greater than 0.38 lb/hr would exceed the 210 mg/m<sup>3</sup> concentration limit of Rule 7 for HCl. FMW has elected to use wet scrubbers to control the HCl from its process vents. These scrubbers reduce the concentration from the two of the process to 60% the 210 mg/m<sup>3</sup> concentration limit when operated with a removal efficiency of 95%, which is easily achievable with this type of scrubber for HCl. The process vent servicing the recovery system would need to achieve and maintain a removal efficiency of 99% for HCl to meet the Rule 7 limit for HCl. Increasing the level of removal for this vent for 95% up to 99% would only result in 0.015 lb/hr reduction or 133 pound per year.

45 CSR §7-10.6 establishes mass rates for mineral acids that are de minimis. With the all three scrubbers operating at least 95% level of control, the combined maximum hourly of the three would be only 20% of the hourly de minimis level of 0.1 lb/hr set forth in 10.6 of Rule 7. However, the annual limit under 10.6., which is of 100 pounds per year from all sources located at the same facility, would be exceeded by 88 pounds per year by FMW proposed facility.

Further in 45 CSR §7-10.6, the Director may determine on case-by-case basis that certain level of mineral acid emissions are insignificant. The annual release of HCl basis on FMW's anticipated operating schedule would be 42 pound of HCl per year.

FMW designed and built the proposed scrubbers themselves. The selected design and operation is unique to their process output. These scrubbers will use a venturi to create and maintain an induced draft across the scrubber. Because of the selected design and lack of other key data, standardize methods develop by U.S. EPA to evaluate these scrubber most like are not appropriate to verify the design, removal efficiency and operating parameters. In these instances, the course of action would be require a compliance test to either verify the proposed emission rates or removal efficiency. As noted earlier, these scrubbers will be operating at very low flow rate and unique design. Therefore, there is potential that a alternative testing method will need to be develop for this particulate source should this course of action is needed.

Therefore, it is this writer recommendation that an alternative HCl limit be created and established in an enforceable permit as outline in 45 CSR §7-10.6. Before consider how or what the alternative limit should be, one needs to consider how the source would demonstrate compliance. Typically, emission limits are set for individual emission points. FMW's manufacturing process is somewhat integrated together. Individual emission points would not be practicable. Determining actual emissions of HCl on a facility-wide basis using a mass balance approach would yield accurate result given over a lengthy time (i.e. year).

Typical wet scrubbers using just water to control HCl usually can achieve removal efficiencies between 90 to 95%. Given than FWM is using sodium hydroxide to enhance the

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removal of HCl, this writer believes these proposal scrubber should be capable of 95% at all times. In addition, FMW proposed to use ph probes to monitor the ph of the water solution and programmable logic controller to adjust the amount of sodium hydroxide to maintain a ph between seven and eight (neutral). Thus, the water solution should never be saturated to the point than it cannot absorb any addition HCl.

Therefore, the alternative HCl limit for this facility should be set at 188 pounds of HCl per year and that every process vent must be controlled with the use a wet scrubber as proposed in the application. Compliance with the limit shall be conducted using a mass balance approach once every calendar and using a control efficiency of 95% for HCl removal for the proposed scrubbers.

**45CSR13 - Permits for Construction, Modification, Relocation and Operation of Stationary sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, Permission to Commence Construction, and Procedures for Evaluation**

The purpose of this rule is to set forth the procedures for stationary source reporting, and the criteria for obtaining a permit to construct and operate a new stationary source which is not a major stationary source, to modify a non-major stationary source, to make modifications which are not major modifications to an existing major stationary source and to relocate non-major stationary sources within the State of West Virginia.

FMW's proposed facility would have the potential before controls of 0.43 lb/hr and less than 2 tons per year of HCl emission, which is classified as a hazardous air pollutant. Thus, the applicant is not required to obtain a construction permit pursuant to this rule for this proposed facility based on the emission trigger levels as defined in 45 CSR §13-2.24.c. However, the proposed facility is subject to a substantive requirement of 45CSR 7. Therefore, 45CSR §13-24.a. defines the proposed facility at "stationary source" and 45 CSR §13-5.4. required FMW to obtain an permit for constructing such a "stationary source".

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As result, the applicant has submitted a complete application, published a class I legal ad in *The Preston County Journal*, and paid the application filing fee. This proposed manufacturing facility is not using controls or seeking other limits to avoid other permitting rules (i.e. 45CR14, 45CSR19, and 45CSR30). FMW's proposed facility is classified as true "minor source" under the Clean Air Act. Therefore, this facility is defined as a "6C" source under 45 CSR 22.

### TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The majority of non-criteria regulated pollutants fall under the definition of Hazardous Air Pollutants (HAPs) as defined under Section 112(b) of the Clean Air Act (CAA). As part of this application process, the facility's potential to emit of HAPs from the associated sources is HCl.

According to Integrated Risk System (IRIS), HCl has not been to be known or suspected carcinogen towards humans. There are other non-carcinogenic chronic and acute effect associated with exposure to HCl. These adverse health affects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. The file contains summaries of the IRIS database information for HCl. For a complete discussion of the known health effects, refer to the IRIS database located at [www.epa.gov/iris](http://www.epa.gov/iris).

## AIR QUALITY IMPACTS ANALYSIS

This writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed modification does not meet the definition as a major modification as defined in 45CSR14.

## MONITORING OF OPERATIONS

The area of concern from this facility concerning compliance is to ensure proper operation and maintenance of the scrubbers. FMW will have three wet scrubber using water/sodium hydroxide solution as the scrubbing fluid controlling HCl emissions from their process vents. The following parameters with corresponding limits need to be monitored:

- Hourly average Scrubber liquid flow rate not to drop below 1 gallons per minute.
- Ph of the water solution in the tank between 7 and 8.
- Pressure of the spray header should not drop below 30 psig.



## RECOMMENDATION TO DIRECTOR

Therefore, I recommend that the Director grant a construction permit to FMW Composite System, Inc. for the construction of carbon fiber manufacturing facility. This draft permit would create an alternative mineral acid limit for this facility as allowed under 45 CSR §7-10.6 in lieu of the concentration based allowable limit under 45 CSR §7-4.2.

Edward S. Andrews, P.E.

Engineer

Date: April 26, 2011

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